

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) PACKAGING FILAMENTARY TOWS

(71) We IMPERIAL CHEMICAL INDUSTRIES LIMITED, of Imperial Chemical House, Millbank, London S.W.1. a British Company do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to packaging filamentary tows into boxes or other suitable containers in such manner that after storage or transport the tow may be continuously and evenly withdrawn for further processing for example into spun yarn.

It is known to lay a tow into a box from an overhead gravity feeding funnel and to compress it to reduce its volume by hand or mechanical tamping. It is also known to package loose fibrous material into a bag by a vacuum packaging technique and to provide the bag with a further restraining means to form a bale for transportation.

According to our invention we provide a method of packaging filamentary tow comprising supporting a flexible substantially air impermeable liner within an open topped prismatic container having an upward extension of the walls thereof, feeding the filamentary tow into the liner with a traversing motion adapted to provide substantially uniform laying of the tow in successive layers over substantially the whole plan area of the container until a predetermined quantity of tow has been fed into the liner, evacuating air from the liner by means of a suction probe above the layered tow until the tow is compacted and then enclosing it within restraining means, preferably a carton sufficiently closely fitting to prevent the tow from moving and tangling and so permit its continuous, and even, subsequent withdrawal.

No appreciable compaction is brought about by the weight of the laid tow itself, but removal of air from the liner may be used to reduce the original volume by at least 50%. Reducing the volume by about 65% has given excellent results during subsequent withdrawal of tow together with significantly lower volume for

a predetermined weight which is useful during transport and storage.

The open topped container may be closable so as to form a transportable carton. Alternatively the compacted tow may be removed from the container and then packed in a carton; and it is possible for the liner merely to be strapped for instance with steel bands for handling as a bale. The first two alternatives are preferred in order to prevent disturbance of the tow and promote evenness during withdrawal. The upward wall extension is preferably arranged to collapse progressively as the liner is being evacuated. Preferably the liner with its tow content is compacted by evacuation down to a size within the inside walls of the container so that the upward wall extension may be removed. The liner with its tow content may be made smaller than the dimensions of the container and allowed to expand again slightly. It is not necessary to take any measures to exclude air from the liner after the compaction step, though under certain circumstances it may be convenient to do this until the liner is contained within strapping or a carton. A convenient method of removing air from within the liner is by a probe consisting of a flexible tube having a rigid end portion consisting at least in part of an air permeable gauze. The open top of the liner may be wrapped round the probe to form an adequately airtight temporary seal. The liner may conveniently be made from a film of polyethylene, polypropylene, polyvinyl chloride or polyethylene terephthalate.

We have found linear traversing satisfactory during packaging and we prefer to use a rectangular based container and traverse it slowly in a line at right angles to a linear tow traversing motion. During each traverse the liner is advanced by a distance corresponding to the width of the tow to provide even laying.

One embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which Figures 1 to 8 are schematic side views of apparatus showing in sequence the steps of the method of the invention.

Referring to the drawings, Figure 1 shows an empty container (1) with an extension (2), clamped into position by wing nuts and bolts 2A and 2B and an air impermeable liner (3) folded into position. Figure 2 shows a side-ways laying mechanism (4) for a filamentary tow (5). This is synchronised with slower back and forth movement mechanism indicated at (6) for the container (1) to ensure uniform laying of the tow in layers of over substantially the whole plan area of the container. When the liner (3) is filled with tow (5) feeding is interrupted, the tow is cut and a vacuum probe (7) is inserted into the liner, and laid on top of the tow without disturbing the lay of the contents. Wings nuts and bolts (2A) and (2B) are unclamped so that extension (2) may telescope over the container (1), as shown in Figure 5. The liner is then made airtight around the probe and evacuation of the air from the liner is begun with the probe resting on the top layer of the tow, without burying it. The liner may be simply gathered up round the probe and tightened round the tube of the probe as shown in Figure 4. The liner with its content contracts, and as the liner bag wrinkles and shrinks it takes the extension (2) progressively down with it. On completion of evacuation to a pressure of 380 mm. of mercury, the extension (2) may be withdrawn. A hinged side door (9) is opened as shown in Figure 6 and the liner with its contents of filamentary tow pushed out from the container onto a roller table conveyor as shown in Figure 7, tipped on one side and inserted into an open cardboard packing case (11) after rolling down the incline of the roller table conveyor. In one form of the apparatus the packing case is steadied against a pivoted platform which can be tilted upright as shown in Figure 8. Lid side flaps (13) and (14) as well as back and front flaps (not shown) are closed and the packing

box (11) is strapped, the probe withdrawn, the carton sealed, and made ready for dispatch. Instead of using a container with a hinged door or a removable side for removing the liner with its tow contents, the whole container may be hinged and the liner with tow contents tipped out.

When the container or box with the liner is inverted and opened, access is obtained to that end of the tow which was first laid, and this facilitates its even removal.

By the word "prismatic" in the specification and claims we intend to include the special case of a cylinder; the practically important container forms being rectangular and cylindrical.

WHAT WE CLAIM IS:—

1. A method of packaging filamentary tow comprising supporting a flexible substantially air impermeable liner within an open topped prismatic container having an upward extension of the walls thereof, feeding the filamentary tow into the liner with a traversing motion adapted to provide substantially uniform laying of the tow in successive layers over substantially the whole plan area of the container until a predetermined quantity of tow has been fed into the liner, evacuating air from the liner by means of a suction probe above the layered tow until the tow is compacted and then enclosing it within restraining means.
2. A method according to Claim 1 in which the container is rectangular.
3. A method according to either of Claims 1 or 2 in which the container is a closable carton.
4. A method of packaging filamentary tow substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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